

Warming Up Before a 20-Minute Endurance Effort: Is It Really Worth It?

Barranco-Gil D, Alejo LB, Valenzuela PL, Gil-Cabrera J, Montalvo-Pérez A, Talavera E, Moral-González S, Clemente-Suárez VJ, Lucia A **ABSTRACT**

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***PURPOSE:** To analyze the effects of different warm-up protocols on endurance-cycling performance from an integrative perspective (by assessing perceptual, neuromuscular, physiological, and metabolic variables). **METHODS:** Following a randomized crossover design, 15 male cyclists (35 [9] y; peak oxygen uptake [VO_{2peak}] 66.4 [6.8] mL·kg⁻¹·min⁻¹) performed a 20-minute cycling time trial (TT) preceded by no warm-up, a standard warm-up (10 min at 60% of VO_{2peak}), or a warm-up that was intended to induce potentiation postactivation (PAP warm-up; 5 min at 60% of VO_{2peak} followed by three 10-s all-out sprints). Study outcomes were jumping ability and heart-rate variability (both assessed at baseline and before the TT), TT performance (mean power output), and perceptual (rating of perceived exertion) and physiological (oxygen uptake, muscle oxygenation, heart-rate variability, blood lactate, and thigh skin temperature) responses during and after the TT. **RESULTS:** Both standard and PAP warm-up (9.7% [4.7%] and 12.9% [6.5%], respectively, $P < .001$), but not no warm-up (-0.9% [4.8%], $P = .074$), increased jumping ability and decreased heart-rate variability (-7.9% [14.2%], $P = .027$; -20.3% [24.7%], $P = .006$; and -1.7% [10.5%], $P = .366$). Participants started the TT (minutes 0-3) at a higher power output and oxygen uptake after PAP warm-up compared with the other 2 protocols ($P < .05$), but no between-conditions differences were found overall for the remainder of outcomes ($P > .05$). **CONCLUSIONS:** Compared with no warm-up, warming up enhanced jumping performance and sympathetic modulation before the TT, and the inclusion of brief sprints resulted in a higher initial power output during the TT. However, no warm-up benefits were found for overall TT performance or for perceptual or physiological responses during the TT.*

KEYWORDS:

cycling; exercise; preconditioning; time trial